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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,167	05/25/2006	Jean-Yves Chane-Ching	99342.00073US	3655

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EXAMINER	
WANG, CHUN CHENG	
ART UNIT	PAPER NUMBER
1796	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/563,167	CHANE-CHING, JEAN-YVES	
	Examiner	Art Unit	
	Chun-Cheng Wang	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the Amendment filed on 09/30/2008. Claims 1-19 are now pending. Claim 20 has been cancelled.

2. The objections and rejections not addressed below are deemed withdrawn.

3. The text of those sections of Title 35, U.S. Code not included in this section can be found in a prior Office Action.

Claim Objection

4. Claim19 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The temperature range recited in this claim is exactly the same as step iii) of claim 14.

Claim Rejections - 35 USC § 102

5. Claims 1-5, 7 and 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Itoi et al. (US6159437).

Itoi et al. disclose an apatite (read on claims 1 and 4) dispersion with polymeric phosphate (read on claims 1, 5 and 9-10) dispersion agents such as sodium hexametaphosphate and sodium tripolyphosphate (column 3 lines 53 and 54) and the size of the apatite particle is **10-100 nm in short-axis and 30-300 nm in long axis** (read on claims 1-3) (column 3 lines 23-27) (column 3 lines 22-24). Itoi et al. also disclose the amount of apatite particles in the dispersion media differs according to the use for which it is intended, if the density of the slurry is too low the dispersion effect will be inadequate, and If the density of the slurry is too high, the slurry will

become viscous, and the reaggregation will be facilitated due to interaction between the particles after dispersion, and the concentration should be within the range of 0.01 and 80 percent by weight (column 4, lines 10-21). The dispersion agent to calcium molar ratio of 0.2 and 0.06 (read on claims 7 and 11) can be obtained by using 1 wt % of sodium triphosphate with 99 wt % of apatite and by using 5 wt % of sodium hexametaphosphate with 80 wt % of apatite respectively. Hydroxyapatites are zwitterions, the hydroxyapatite derivatives are products in which cations or anions have been partially exchanged or reacted with Ca^{2+} or OH^{-}. Examples of such products include: fluoroapatites, in which fluorine atoms have been substituted for hydroxyl groups; chloroapatites, or carbonated apatites; barium apatites, strontium apatites, or magnesium apatites, in which other alkaline earth metal elements have been substituted for calcium; copper-substituted apatites, zinc-substituted apatites, or lead-substituted apatites, in which calcium ions have been partially exchanged with divalent metal ions; and others, including silver-substituted apatites, cesium-substituted apatite (read on rare earth metal of claim 12), etc. Any of these can be obtained by treating hydroxyapatites with appropriate metallic salt solutions or prescribed anionizing agents which exchange ions in aqueous solution (column 3, lines 3-19). Itoi et al. further disclose apatite powder obtained by spray (read on claim 13) (column 4, line 66).

Claim Rejections - 35 USC § 103

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itoi et al. (US6159437)

The disclosure of Itoi et al. is adequately set forth in paragraph 5 and is incorporated herein by reference.

Itoi et al. is silent on the polymers.

Kumta et al disclose polymers complex calcium phosphate which include polyamino acids (column 9 lines 43-44), such as poly-L-lysine, read on carboxylate functional group and peptide backbone of polyaspartic acid, polygumatic acid, polylysine or polyglycine, non-erodible polymers such as polyacrylate (column 9 line 48), and polysaccharides such as starch (read on claim 6) (column 9 lines 27-28). Polymers such as polyacrylate improve the composite material mechanical strength.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to produce the compounds with complexing polymer that have stronger mechanical strength.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itoi et al. (US6159437).

Itoi et al. are silent on the molecular weight of the polymer.

The higher the molecular weight of the polymer will increase the colloidal dispersion viscosity and make it difficult to process. But if the polymer molecular is low, the hydroxyapatite will not have enough mechanical strength.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to adjust the polymer molecular weight in the claimed range to obtain the composite compound having strong mechanical strength while still easy to process.

8. Claims 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumta et al. (US7247288) in view of Fujishiro et al. ("Coating of Hydroxyapatite on Titanium Plates Using Thermal Dissociation of Calcium-EDTA Chelate Complex in Phosphate Solutions Under Hydrothermal Conditions", Journal of Colloid and Interface Science 173, 119-127 (1995)).

Kumta et al. disclose hydroxyapatite was chemically synthesized using $CaCl_2$ (read on claims 14-15) and Na_3PO_4 (read on claims 14 and 17) in deionized water. Stock reagent solutions were first prepared, including: 2 M (read on claim 16) calcium solution (read on claim 14 step i)) (column 18, lines 28 and 29), buffered saline (…1.5 mM Na_3PO_4…) (read on claim 14 step ii)) and claim 17) (column 18, lines 31 and 32). The calcium solution, 20 mMoles, containing plasmid DNA was mixed with Na_3PO_4 solution, 1.5 mMoles, then incubated for either 4 or 12 hours at a pH of 7.5 and temperature of 37°C and the nanocrystalline hydroxyapatite was formed (column 18, lines 18 to 25). The solution was then washed (column 18, lines 41-52). Kumta et al. also disclose a typical protocol includes the steps of adding the $CaCl_2$ solution containing plasmid DNA to the Na_3PO_4 solution in the presence of a water soluble polymer such as polyethylene glycol or PMMA. The resulting mixture can then be air-dried or dried in vacuum to generate the polymeric structure containing the nanosized hydroxyapatite particles (column 22, lines 23- 29). The hydroxyapatite has Ca/P molar ration of 1.67 (read on claims 14 and 18) (column 1, line 29). Kumta et al. also disclose widely used aqueous colloidal precipitation reactions to synthesize hydroxyapatite are as follows:

$$10Ca(OH)_2+6H_3PO_4 \rightarrow Ca_{10}(PO_4)(OH)_2+18H_2O \quad \text{(Formula I)}$$

$$10Ca(NO_3)_2+6(NH_4)_2HPO_4+2H_2O \rightarrow Ca_{10}(PO_4)_6(OH)_2+12NH_4NO_3+8HNO_3 \quad \text{(Formula II)}$$

Formula II indicates the use of ammonium phosphate (read on claims 14 and 17).

Kumta et al. are silent on the pH 4-6 and temperature of 50°C-95°C.

Higher temperature will increase reaction rate and thus shorten the reaction time.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to increase the reaction temperature to 50°C-95°C. range to have shorter reaction time.

Fujishiro et al. disclose when titanium plates were treated in Ca-EDTA-NaHPO4 solution at 160oC, they were uniformly coated with plate-like monetite particles and fine needle-like hydroxyapatite particles at pH 5, whereas aggregates consisting of needle-like and/or rod-like hydroxyapatite and plate-like monetite were deposited on the surface as islands above pH 6 and at pH 4 (Abstract).

In view of this teaching, it would have been obvious to one of ordinary skill in the art at the time of the invention to use take advantage of the pH 4-6 of Fujishiro et al. to produce the plate-like nanoparticle colloidal dispersion.

Response to Arguments

9. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

10. Applicants' alleged: The particles of Kumta et al. "are not platelets as described in the present application and recited in claim 1.".

Response: Since claim 1 recites particle length and thickness without width, examiner broadly interpreted the particle could be in rod or needle shapes.

11. Applicants' alleged: 'Kumta et al. does not describe a colloidal dispersion comprising … and at least one polymer which complex calcium" and "The matrix may be a natural or synthetic

polymer. A matrix for use in biomedical … is very different the polymer claimed in the present application."

Response: Kumta et al. disclose the matrix may be a polymer that is either a natural polymer or a synthetic polymer, or combinations (column 8, lines 53-55) and natural polymer include polysaccharides and synthetic polymers such as polymethyl methacrylate (column 9, lines 25-58) which are included in polymers of claims 5 and 6. Attention also drawn to last paragraph of column 7, which disclose complexing biomaterial with the hydroxyapatite.

12. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chun-Cheng Wang whose telephone number is (571)270-5459. The examiner can normally be reached on Monday to Friday w/alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ling-Siu Choi/
Primary Examiner, Art Unit 1796

Chun-Cheng Wang
Examiner, Art Unit 1796

/CCW/